

STUDIES ON THE PHYSICO-CHEMICAL PARAMETERS OF VELLAIYAR ESTUARY OF VAILANKANNI, NAGAPATTINAM, EAST COAST OF INDIA.

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Abstract:- Water is one of the most common and the large precious resources on world. ground water resources have been contaminated by organic, inorganic and biological pollution. Therefore management of aquatic ecosystem in particular has become a main concern in present years. Surface water samples were collected from Vellaiyar estuary are during period of January 2015 to June 2015. The pH meter was used to determine the pH and Temperature, The Dissolved oxygen, silicate. Estimate of phosphate, Nitrate was handled.

Keyword:-

Dissolved Oxygen, Temperature, Silicate, Phosphate, Nitrate

Introduction

Water is one of the most common and the large precious resources on world, without which there would be no life on world, pollution is a serious problem as 70% of India's surface water resources and ground water resources have been contaminated by organic, inorganic and biological pollution. Therefore management of aquatic ecosystem in particular has become a main concern in present years. Estuarine and coastal areas are complex and dynamic aquatic environment (Morris, et.al.1995). Estuaries constitute a major Interface between land and the ocean and have been regarded as one of the most important aquatic system. The progressing of large buildings

(Municipal - waste) In Vailankanni has become a threat to the health of the vellaiyur Estuarine and coastal water environment. The sewage from urban area and industrial wastages contributes a constant source of pollutants, where as the surface runoff is a seasonal phenomenon largely affects by climate in the basin. The urban inputs, agricultural runoff and industrial inputs play a vital role in nutrient cycling, water quality eutrophication, biota abundance and overall food web dynamics in Estuaries and near shore ecosystems, apart from this fishing activities near the estuary also influence the water quality parameters, [Blader et.al.2000] nutrient enters into coastal seas through various modes viz, terrestrial runoff, estuary, effluent discharge etc. the quick alternation in nutrient structure effects the phytoplankton taxonomic composition and in order leads to the eutrophication and algal blooms (Bethoux et.al.,2002; Piehler et.al.,2004). The water quality depends on both natural processes, such as precipitation erosion, weathering of crystal materials and anthropogenic processes like urbanization, Industrialization, Mining and agricultural activities.(G.J.Chakrapani et.al.,1993). The various physico-chemical factors such as temperature, pH, salinity, DO and nutrient such as nitrate, phosphorus and silicate. Several investigations have been carried out on the physico-chemical features of southeast Indian estuaries viz., Uppanar estuary (Nedumaran et al.,

2011). Muthupet mangroves (Paramasivam and Kannan, 2005). Pichavaram mangroves (Ashok Prabu, 2008). Vellar estuary (Rajasegar, 2003). No work has been published on the physico - chemical characteristics in vellaiyar estuary vailankanni, vailankanni a world famous tourist place in India. Hence the present study was conducted to study the hydrobiology in the vellaiyar estuary, south east coast of India.

MATERIALS AND METHODS

The vellaiyar estuary is situated in the Bay of Bengal on the east cost of India (Lat. 106 82' N Long. 798 44' E). The river Vellaiyar has its origin from Cauvery in katchanam near Thirukkuvalai, Nagappattinam district and runs through places like kolappatu, Thirukkuvalai, valakkarai, and traverses a distance of about 66 km.to form an estuary at Vailankanni. It is free connected canal with mouth region at vellaiyar estuary.

Surface water samples were collected from Vellaiyar estuary are during period of January 2015 to June 2015. Water and air temperatures were measured in the field. The pH meter was used to determine the pH. The Mohr-Knudsen titration procedure and Winkler's method was followed for salinity and dissolved oxygen determination respectively (Strickland & Parsons, 1972). Atmospheric and water temperatures were measured using standard mercury filled centigrade thermometer. The pH of water has been recorded in the field itself using Elico pH meter (model -LI-120). The Dissolved oxygen was estimating (Winkler's Method.Parson-1972). Estimate of silicte was handled (Strickland & Parson 1972). Estimate of phosphate was handled (Strickland&Parson 1972). Estimate of Nitrate was handled (Strickland&Parson 1972).

RESULTS

Monthly variation in metrological and physico-chemical parameters like rainfall, air and surface water temperature, pH, salinity, dissolved oxygen, phosphate, nitrate and silicate contenton vellaiyar estuarine water were recorded. for a period of 6 months from January 2015 to June 2015 (Table. 1). The north east monsoon in Tamilnadu brings rain during the month of October, November and December . During the study period rainfall varied from 2.8 to 80.5 mm. The

minimum was recorded during the month of March 2015. and maximum during the month of April 2015. (Fig.1).The air temperature varied from 30.8 to 37.8°C, the minimum was recorded during the month of January 2015. and maximum during the month of June 2015(Fig.2). The surface water temperature varied form 29.5 to 32°C. The minimum surface water temperature was recorded during the month of January 2015. and maximum was recorded during the month of May 2015(Fig.3). The monthly mean values of hydrogen ion concentration of water varied from 7.5 to 8.5. Maximum values of pH were observed in the month of February 2015. and minimum values were recorded in the month of April 2015. (Fig.4). The salinity in Vellaiyar estuary varied from 24.1 to 30.5 ppt minimum salinity 24.1‰ was recorded during the month of January 2015. and was slowly built up during the month of January 2015.(Fig.5). Dissolved oxygen in Vellaiyar estuary ranged from 3.1 to 4.8 m/l, while the minimum Dissolved Oxygen was recorded during the month of March 2015 maximum occurred in the month of April 2015. (Fig.6). For dissolved phosphorus, the monthly values recorded in vellaiyar estuary ranged from 0.25 to 0.98 µg/l minimum was recorded during the month of February 2015 and maximum during the month of April 2015.(Fig. 7).The silicate varied from 13.25 to 40.20 µg/l, minimum silicate was recorded during the month of February 2015 and maximum during the month of April 2015.(Fig.8).The monthly variation of nitrate recorded in Vellaiyar estuary varied from 1.62 to 6.10 µg/l. The minimum nitrate was recorded during the month of February 2015. and maximum during the month of April 2015.(Fig.9)

DISCUSSION

The monthly variation in meteorological and physico chemical parameters such as rainfall, air and surface water temperature, pH, salinity, dissolved oxygen, phosphate, nitrate and silicate contents in Vellaiyar estuarine waters were recorded for a period of 6 months from January 2015 to June 2015. The surface water temperature largely depends upon the intensity of solar radiation, evaporation, freshwater influx, cooling and mixing due to currents and tidal flow. Surface water

temperature also showed a similar trend of monthly variation as that of air temperature and the high values were reported during the Month of June 2015. and lower values during the month of January 2015. The gradual increase in water temperature from post monsoon to summer is directly related to atmospheric conduction and radiation similar finding were reported by (Thanjaraj, 1984). During the study period air temperature varied from 30.8 to 37.8°C, the minimum was recorded during the month of January 2015 and maximum during the month of June 2015. Dissolved oxygen is one of the most important parameters which reflects the physical and biological processes of water. The dissolved oxygen content depends upon the photosynthetic activities, monsoonal floods and the turbulence caused by winds (Nedumaran, *et al.*, 2012). In the present study, the dissolved oxygen concentration was low during post monsoon and high during summer period. During 6 months the dissolved oxygen concentration was low in post monsoon compared to summer season which may perhaps to due to low rainfall recorded during the period. The trend noticed in the present study is in accordance with the findings of hydrology and heavy metals (Rajasegar, 2003). The seasonal variation of salinity in Vellaiyar estuary is graphically represented (Fig.5). A marked seasonal change in salinity was observed throughout the study period minimum salinity was recorded during the month of January 2015. and increased slowly during summer and attained maximum level May 2015. The salinity variation in the exchange of ions and nutrient is because of the tidal flow and low during the summer season in the vellaiyar estuary. The present study in the conformity with the earlier reports from velar estuary (Palpani 2011; Sing 1976; Soundarapandian, *et al.*, 2009). The monthly mean values of hydrogen ion concentration of water varied form 7.5 to 8.5. Maximum values of pH were observed in the month of February 2015. minimum values were recorded in month of April 2015. The minimum values of pH during the environmental changes in the study area may be controlled by the influence of freshwater discharge rainfall and the decomposition of organic matter as started by (Ragothaman and Patil 1995; Upadhyay, 1998). The photosynthetic activity may cause high pH, because of

bicarbonate degradation by carbonic anhydrase associated with photosynthesis (Rajkumar, *et al.*, 2009). In the present study the total phosphorus and nitrate were found to be higher during summer periods and decreased slowly from post monsoon onwards, high concentration of total phosphorus during summer season due to heavy rainfall, decomposition of particulate organic matter industrial effluents discharges from the adjacent lands serious omissions such summer maximum and post monsoon minimum in the total phosphorus concentration were also reported from velar estuary (Chandran and Ramamoorthi, 1984).

The peak values of silicate observed during summer may be attributed of the heavy fresh water influx and land run off which carries silt and other silicon deposits from upper the reaches of the river, observations similar to present study were reported earlier by (Oasim, *et al.*, 1969; Ansari and Rajagopal, 1974) in Cochin back water's (Nair, *et al.*, 1984). In Ashthamudi estuary (Prabha Devi, 1986) in coleroon estuary. The silicate concentration also showed earlier in velar estuary (Chandran and Ramamoorthi, 1984; Thangaraj, 1984) and in Kerala back waters (Sarala Devi, *et al.*, 1991). The conclusion of the present study is the physico chemical parameters influence in vellaiyar estuary are not extremely pollutant but at the same time there is a possibility of gradual change in due course. It reveals that the estuarine environment is largely influenced by the annual seasonal changes.

SUMMARY

The physico-chemical changes may have the tendency to accumulate in the various organs of estuarine organisms, especially molluscs which may in turn enter into the human metabolism through consumption causing serious hazards. Hence, the present study was carried out to determine the physico-chemical in Vellaiyar estuary in South East coat of India for the period of 6 months during January 2015 – June 2015. The environmental parameters such as rainfall, temperature, pH, Salinity, DO, Silicate, nitrate and phosphate were observed from Department of Zoology, Rajah Serfoji Government College, Thanjavur, Tamilnadu, India. During the period of study rainfall varied from 30.8 to 37.8°C. The surface water temperature also varied from 29.5 to 32.2°C.

The monthly mean values of hydrogen ion concentration of water varied from 7.5 to 8.5 the salinity of water varied from 24.1 to 31.2‰. Dissolved oxygen in Vellaiyar estuary was

varied from 2.3 to 4.8 ml/l. The total phosphorus varied from 0.20 to 0.98 µg/l. The silicate content varied from 13.25 to 40.20 µg/l.

PHYSICO-CHEMICAL PARAMETERS OF VELLAIYAR ESTUARY FROM VAILANKANNI. Table-1

Parameters	Rainfall mm	AT (°C)	WT (°C)	pH	Salinity (ppt)	Dissolved oxygen (ml/L)	Silicate (µg/l)	Phosphorus (µg/l)	Nitrate (µg/l)
Ja	2.4	30.8	29.5	7.8	24.1	4.2	26.20	0.60	2.50
Fe	0	33.5	31	8.5	29	3.8	13.25	0.25	1.62
Ma	2	33.9	30	7.9	31	2.3	25.60	0.55	2.15
Ap	80.5	36.1	31.5	7.5	28.5	4.8	40.20	0.98	6.10
Ma	48.9	37.6	32	7.6	31	3.3	30.30	0.40	4.43
Jun	47.6	37.8	32.2	7.9	30.5	3.1	29.45	0.20	3.80

Check List of Physico-Chemical parameter of Estuary

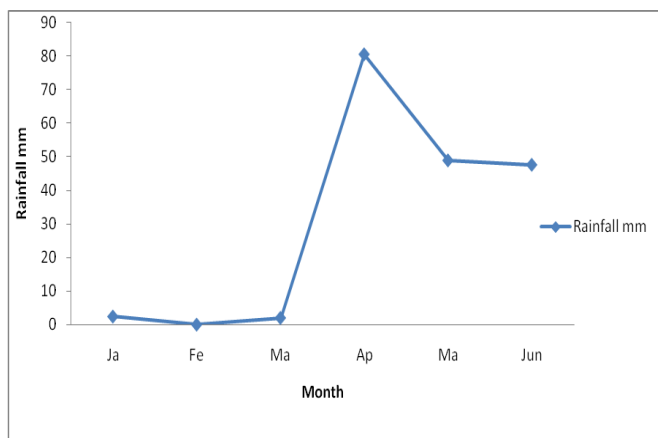


Fig 1: Seasonal Changes in Rainfall during in the study area and study period

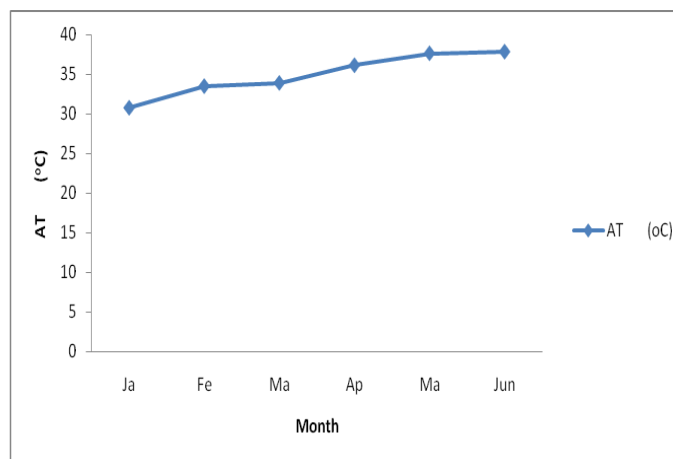


Fig 2: Seasonal Changes in Atmospheric Temperature during in the study area and study period

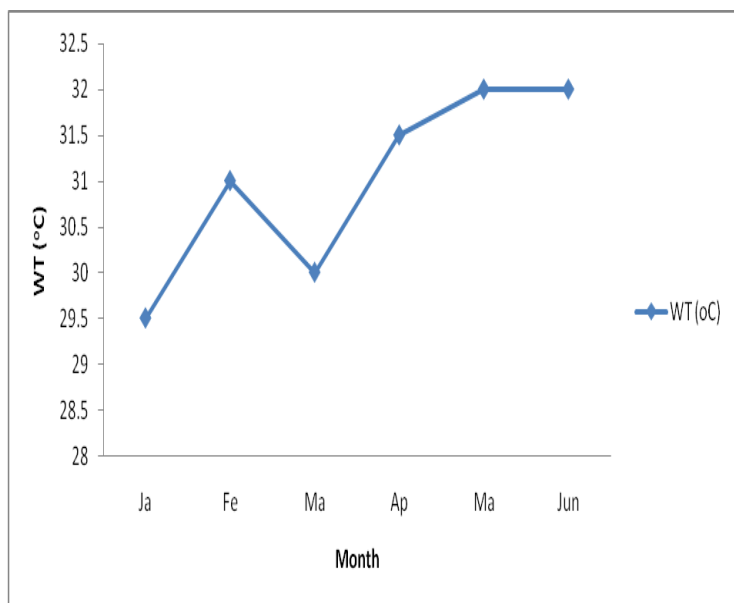


Fig 3: Seasonal Changes in Water Temperature during in the study area and study period

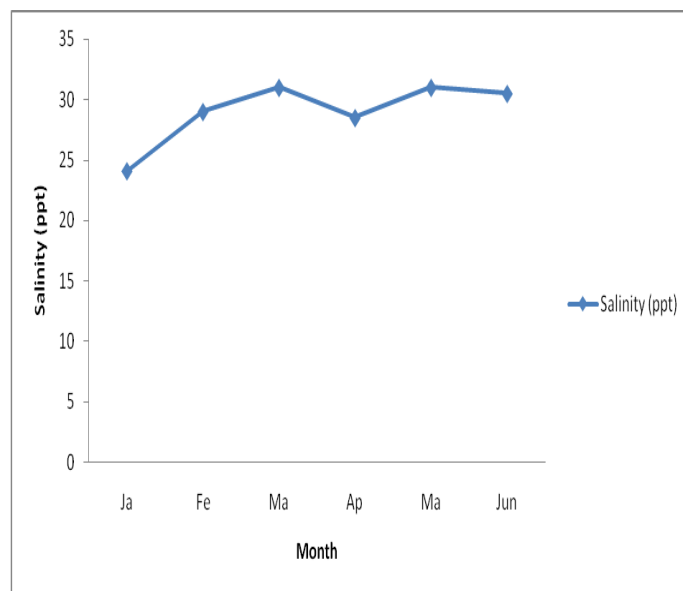


Fig 5: Seasonal Changes in Salinity during in the study area and study period

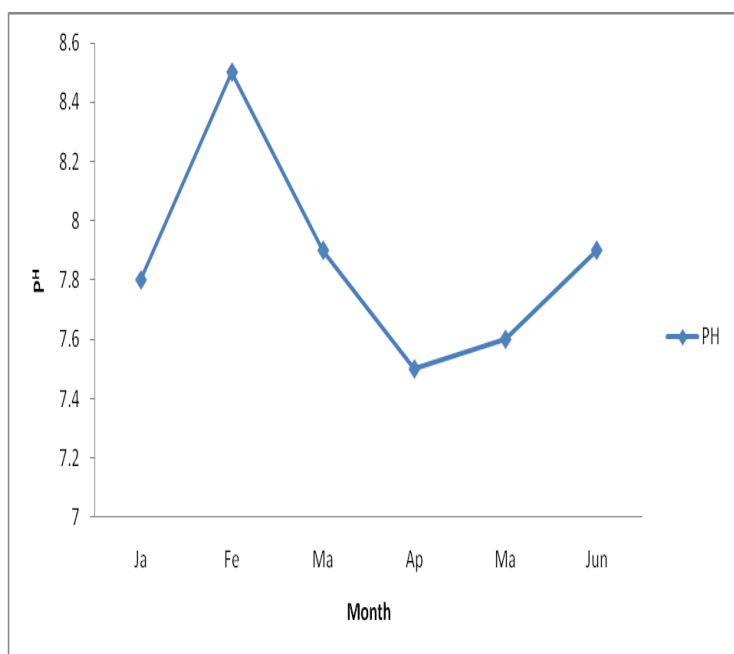


Fig 4: Seasonal Changes in P^H during in the study area and study period

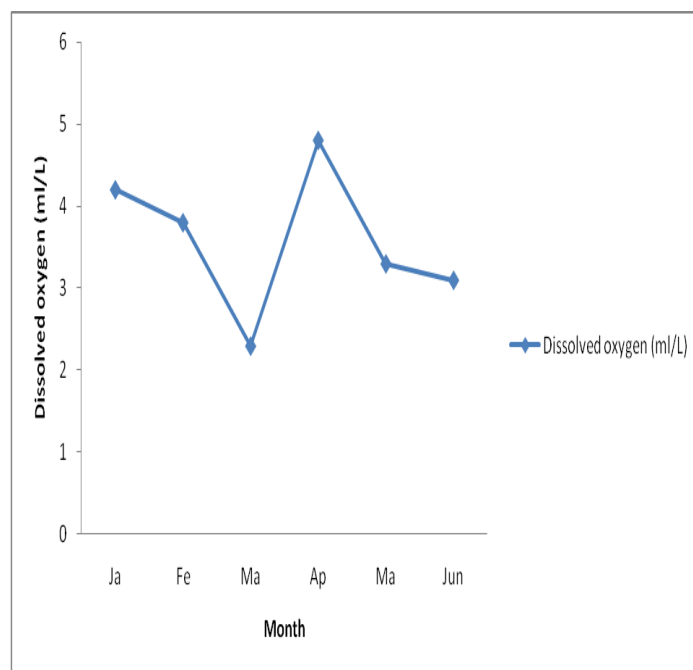


Fig 6: Seasonal Changes in Dissolved oxygen during in the study area and study period

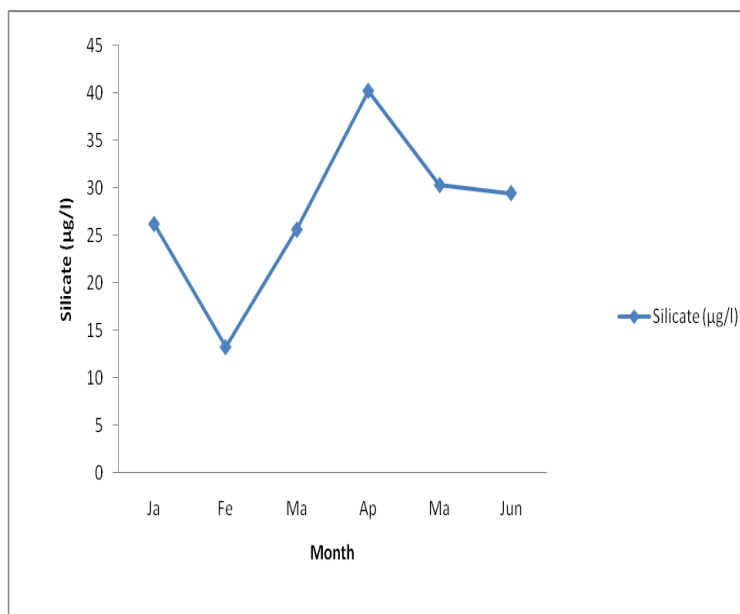


Fig 7: Seasonal Changes in Silicate during in the study area and study period

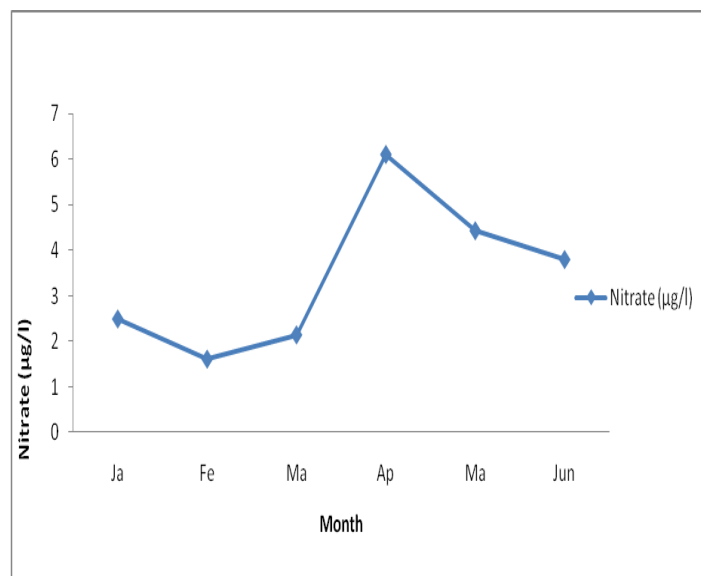


Fig 9: Seasonal Changes in Nitrate during in the study area and study period

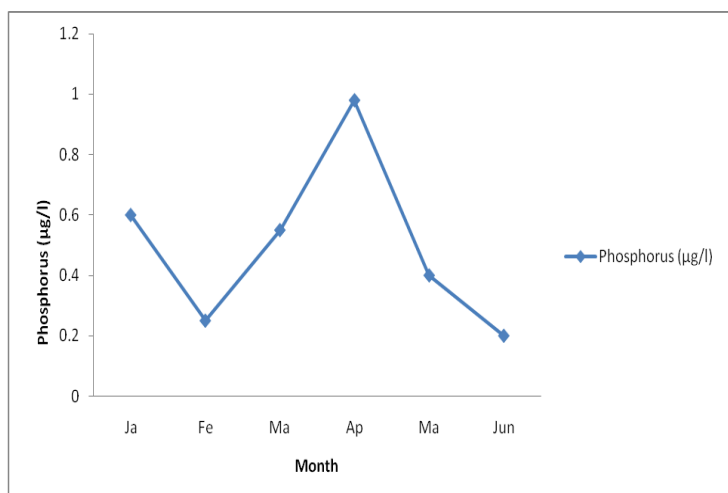


Fig 8: Seasonal Changes in Phosphorus during in the study area and study period

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